

A proposal to create a federal corporation to operate nuclear reactors that burn nuclear waste as fuel

I propose that this federal corporation would at least in part be operated in a profit loss accounting model used by TVA. The cash flows earned by this corporation would be from the nuclear waste trust funds for disposal of the nuclear waste, new fuel created by the reactors, and electricity sells.

The development of the molten salt thorium fueled reactors should be paid for by the DOE. Construction of the first demonstration plant should be paid for by the DOE but operated by the federal corporation for a fee. The nuclear waste burned as fuel will earn the federal corporation a fee from the trust fund and from electrical sells.

The reactors shall be placed where possible at existing commercial nuclear plant sites in areas geographically close to the location of existing nuclear waste stock piled at those nuclear plants. States that have contributed the most to the waste fund and/or have the most civilian waste would host the first reactors for several reasons, (1) the reactor would return the economic benefit of the waste fund fees to the community that paid them. (2) Equity, the burden of burning the waste as fuel would be distributed across the nation (3). (4) Safety! , Less distance to ship the waste fuel to the waste fuel burning reactor (5). Future opportunity to privatize the reactors by utilities in the states they are located in may present them self's to future decision makers, indeed the federal corporation could contract with the utility who's site their reactors are located on to have there employees operate the reactor and gain experience in the new technology.

These reactors of course would have to meet NRC safety rules and as such should be available to any utility that wishes to produce more fuel by burning thorium, indeed once proven a utility could burn waste on site. It may be the case that no reactor will ever be economic if it burns waste in a thorium cycle since it must reprocess on site from the molten salts however this is the reason for the fee chargeable to the waste trust funds. For reactors such as this that do not burn waste from other reactors would charge the rate payers for the molten salt reprocessing how ever these funds should be in a trust fund to insure that any waste or business failure covers the cost of any decommissioning.

The purpose of this federal corporation would be to pioneer the economics and safety of on site molten salt reprocessing; it may not succeed when it comes to economics!, but it might succeed as a method to destroy nuclear waste, But cost trades should be done with traditional nuclear fuel reprocessing technology to see which is most cost effective with the anticipated \$ 90 billion in fees through 2050 that utilities and rate payers will have paid to dispose of nuclear waste. Traditional reprocessing does not produce electricity.

Some more thoughts,

(1) At the commercial nuclear sites that host the federal corporation waste burner reactors we should pick out sites with the most waste so as to rid our self's of waste transportation questions. Which site in Illinois has the most waste on storage? South Carolina?

(2)TVA has many sites with wastes in the south one of these existing sites might make a good candidate for the waste burning demonstration reactor.TVA has a large amount of waste to burn with in a short transportation distance not counting the existing TVA site where the waste burner would be located.

(3) The TVA waste is close to the DOE South Carolina waste, transporting DOE South Carolina waste through the Appalachians sounds like a safety issue to me as trains and trucks have issues in the mountains. The TVA reactors at Chattanooga and Browns Ferry might make the most sense for a regional waste burner reactor as they already have power transmission infrastructure and are closer to flatter and lower elevation transportation routes.

(4) TVA may be in decades to come become the transitional model for privatizing the nuclear waste burner from its sister Federal Corporation to private utilities.

(5) Any waste to fuel technology should in its business model recover, if any, fees from carbon trading systems, Or possibly a share of any carbon tax. Perhaps this blue ribbon commission should discuss and consider sharing the burden of waste to energy technology and business models with possible for profit models but maybe a combined investment in waste to energy by the nuclear waste trust fund as a "share holder" IE the trust fund receives in future any profits from electricity sells plus any fees from a carbon tax or carbon trading schemes. In no case should these carbon taxes or trading schemes disadvantage worthy solar, geothermal, wind or any other renewable project. In no case should this commission recommend using nuclear waste trust funds in developing any system to dispose of spent fuel. Spent fuel trust funds should be leveraged only in the construction of a operating system and if it proves possible to generate power from spent waste then it may become possible for the trust fund to be paid back its investment. The commission should recommend that if space based solar/ nuclear combined system

(6) Transferring any carbon tax or nuclear waste fund trust fund to a nuclear waste burning technology should in fairness be extended to private enterprise if possible but also other federal agencies that may have solutions to the nuclear waste problem. Read the recent Augustine commission report for the president on making NASA decisions, some of the issues raised there have to do with needs across many federal agencies. One of those needs are creating a market for a high launch rate for vehicles for DOD, NASA, and the commercial space flight business in order to reduce costs for these launchers. Could the needs of the blue ribbon commission on nuclear waste coincide? Contact the Augustine commission contractors to find out.

(6) (A) nuclear fuel elements are transported in there payload fairings into LEO where they make a slow trip to a L2 retrievable storage orbit. Only fuel past 40 years of age in dry cask storage make this trip. Waste fuel and payload fairing are transported from LEO to L2 by an ion engine and solar cells. The costs for this are born by the nuclear waste fund and perhaps a carbon tax. A future IRSU mission does a reprocessing. Why? The \$ 30 billion nuclear trust fund is used to along with NASA/DOD/NSC and commercial to mass produce EELV's and this makes possible the human exploration of the inner solar system.

(6)(B) Reprocessed nuclear waste is made into, using navy nuclear technology into a space based nuclear power reactor but it does not end here.....A federal space based solar power corporation uses the small solar power sat idea from PG & E out in California combined with the space based nuclear power unit to industrialize the cislunar space. The nuclear waste trust funds could be collateral on mass producing the launch vehicles to transport the spent fuel out of the biosphere, and this effort could be a recipient of a carbon tax. This idea is most likely not to be classed as a for profit idea! The reprocessing should not be charged against the waste trust fund perhaps a partnership of a carbon tax would do this. The nuclear waste trust fund would purchase in mass the long lead items for the launch vehicles but the assembly and launch of such should be a commercial purchase. The space based solar power federal corporation would after some federal investment and perhaps a demonstration project be placed on a semi for profit accounting basis and would with bond proceeds pay for the fabrication of the nuclear power units from the nuclear waste as well as the power sats from solar. In the alternative perhaps the nuclear waste could be fluoridated for a hot sodium Thorium reactor but this space based reactor would have to be on a smaller scale than the ground based reactors. An interesting question comes to mind, Can a space based Sodium coolant Thorium reactor be a combined power and thermal nuclear propulsion unit? I think not. Could such a reactor provide power to a Vasimer? This might be on the money.

(6)(c) It is my opinion that any federal nuclear and/or space based nuclear/solar electrical power generating enterprise would need a kick start of several \$ 100 billion over a decade or two and not chargeable to the federal enterprise to create a unique synergy between federal enterprises and the private sector to bring in cash flows to self generate capital for investments to expand the enterprise. A tipping point would occur where the cash flow from electrical sells would cover any future capital investments and debt retirement without any federal subsidies of any kind.

(7) This blue ribbon commission should hire the Augustine commission contractor the Aerospace Corporation to ask these questions, what effect would a joint powers purchase of a large number of existing EELV's effect price, or their long lead component parts? What would the costs of a solar power demonstrator the size of a large communications satellite be and perhaps the costs of the space based nuclear unit. The Blue ribbon commission should ask all the national labs to consider the proposals suggested in this paper but also what idea not "invented here" might be out there. The blue ribbon commission should ask NASA what mission it could work on in space that might solve this problem.

(7) (A) The blue ribbon commission should look into one last possibility, The proposed federal nuclear disposal corporation would be authorized to own all of the United States shares in an international space based solar/nuclear electrical power generating corporation modeled on that of Intelsat. One of the compelling reasons why this should be so is that we can not place thousands of powersats in GEO. These slots are taken up with communications satellites, so what to do? I believe that a super synchronous orbit might work, GEO plus 1000 miles. The international power sat corporation would operate a world wide network of ground stations to receive the power and since these powersats would slowly move in relation to the ground stations then they would be handed off to the next station as each in turn came within range. It has been said that NASA's Flexible path might mean a human

mission to GEO + for science but perhaps this great undertaking calls out for the synergy's of a human/robotic presence. Once NASA pioneered this it would become a commercial mission. Once NASA pioneers the fuel depot and on orbit servicing technologies the fleet of solar/nuclear generators would be an immense commercial customer for the fuel depot and on orbit servicing.

## Executive Summary

This Blue ribbon committee should explore the technologies that burn nuclear waste as fuel and that also offset the cost of doing so by the sell of electricity by the reactor that burns the waste but also a reactor design that does not need fuel assemblies. A partnership of federal agencies and national labs should look into any ideas that find themselves presented to this commission to include the International space station. If generating power from spent fuel is practical it should be done at first by a federal corporation using reactors on site of existing nuclear power generating facilities and DOD/DOE facilities. A federal corporation would receive cash flows from power sells, carbon off sets, and the spent nuclear fuel trust fund. This committee should recommend that if spent fuel can be destroyed by producing power then a demonstration project should be attempted on an international scale to fly a small scale reactor in space in partnership with an international project to test the feasibility of space based transmission of power from solar. It is altogether possible that this commission could set in motion the leveraging of spent fuel trust funds as a leveraged investment that pays dividends back to a perpetual spent fuel trust fund in order to build a whole new power industry on earth but a whole new space based power and infrastructure industry in space.